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NON-BREEDING SEASON DIET OF LONG-EARED OWLS IN MASSACHUSETTS

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The Long-eared Owl (*Asio otus*) is a widely-distributed, holarctic species (Burton 1973). In Massachusetts, Long-eared Owls are a species of special concern and little is known of their distribution, biology and ecology (Melvin et al. 1989).

Long-eared Owl food habits have been extensively studied in North America (Marti 1976, Marks 1984), and Europe (Nilsson 1981, Wijnandts 1984, Cramp 1985). At least 23 800 prey items in North America (Marti 1976) and over 360 000 prey items in Europe (Wijnandts 1984) have been identified. To our knowledge, nothing has been published on the diet of these owls in Massachusetts. We located only one study in Connecticut, which reported diet of this species for New England (Choate 1971). Here, we compare non-breeding season diet of Long-eared Owls from two locations in Massachusetts.

Pellets were collected from Nantucket Island and the mainland town of Belmont, approximately 176 km apart. Nantucket Island (130 km²) is composed of moraines and out-wash plains from Pleistocene glaciation (Woodsworth and Wigglesworth 1934). It is also unique in its composition of maritime heaths or "moorlands" (Tiffney and Eveleigh 1985). Belmont is a densely settled suburban town approximately 12 km west of Boston. The topography is geologically a drumlin, dominated by deciduous woods with pockets of conifers. Abandoned orchards and large meadows occur throughout the woodlands.

The owls' non-breeding season was defined as 1 August to 1 April. Owls were observed at roost sites after detection of their pellets or "whitewash." Pellets were collected between November 1984 and February 1985 at irregular intervals. Pellets were air dried for four weeks and then dissected. Prey items were identified by comparing skulls, mandibles, long bones and feathers with museum specimens.

Differences in frequencies of prey between sites were tested using a chi-square test of independence (Siegel 1956). Dietary overlap between sites was calculated using Schoener's (1968) symmetric index. Food niche-breadth was calculated using the antilog of the Shannon-Wiener equation (see Marti 1987). Biomass was calculated using mid-points of weight ranges reported by Godin (1977) for mammals and Dunning (1984) for birds. We used mid-

points because weights of prey can vary with habitat, season, age and sex. Mean weights reported in the literature are most often those of adult specimens and could lead to overestimates of biomass calculations.

Three owls were observed at each roost site. The Nantucket roost was in a dense stand of White Pine (*Pinus strobus*) forest, within 1 km of open moorlands and beach grasslands. The Belmont roost was in a Pitch Pine (*Pinus rigida*) stand, within a mixed deciduous/coniferous forest, and within 0.5 km of meadows and orchards. Smith (1981) and Bosakowski (1984) stated that Long-eared Owls prefer dense stands of coniferous trees. Bosakowski (1984) felt foliage density may afford protection from environmental factors and predation. Our roost sites were also in dense cover.

We recorded 915 prey items from two study sites (Table 1). Four species of mammals and two species of birds were identified. Meadow voles (*Microtus pennsylvanicus*) were the most numerous prey by number and biomass (Table 1). This is consistent with other studies (Marti 1976, Nilsson 1981, Marks 1984, Wijnandts 1984). Choate (1971) reported 91% (N = 128) meadow voles in the Long-eared Owl diet from Connecticut, the only New England study.

Between the two locations, the owls had similar diets (overlap = 99.2%); however, prey species proportions differed significantly ($\chi^2 = 28.4$, $df = 3$, $P < 0.005$). This was due to higher proportions of white-footed mice (*Peromyscus leucopus*) from Nantucket owls and higher proportion of short-tailed shrews (*Blarina brevicauda*) from Belmont owls (Table 1). Food niche-breadth values were similar from the two sites (1.85 at Nantucket and 1.89 at Belmont) and were in the range of values reported for North American Long-eared Owls that feed primarily on voles (1.60–2.30; see Marks 1984).

RESUMEN.—Las dietas de buhos de la especie *Asio otus*, en la estación no reproductiva, en dos áreas de estudio en Massachusetts, han sido determinadas por medio del análisis de egagrópias. Novecientos quince ítems conteniendo residuos de presa han sido identificados. En la Isla Nantucket, la dieta (N = 657) estuvo constituida en el 79% por ratones de la especie *Microtus pennsylvanicus*,

Table 1. Non-breeding season diet of Long-eared Owls in Massachusetts. Prey weights (g) are given in parentheses.

SPECIES	NANTUCKET				BELMONT			
	No.	%	BIOMASS	%	No.	%	BIOMASS	%
Meadow Vole (20-64)	516	78.5	21 672	87.6	206	79.8	8652	88.6
White-footed Mouse (16-29)	122	18.6	2684	10.8	26	10.1	572	5.8
Short-tailed Shrew (12-24)	12	1.8	216	0.9	19	7.4	342	3.5
Meadow Jumping Mouse (13-23)	4	0.6	72	0.3	0			
Blue Jay (64-109)	1	0.2	86	0.3	1	0.4	86	0.9
Northern Flicker (92-129)	0				1	0.4	110	1.1
Unid. Birds	2	0.3	—	—	5	1.9	—	—
Totals	657	100.0	24 730	99.9	258	100.0	9762	99.9

mientras que el 19% correspondió a ratones de la especie *Peromyscus leucopus*. En Belmont, la dieta (N = 258) estuvo constituida en el 80% por ratones de la especie *M. pennsylvanicus*, 10% correspondió a ratones de la especie *P. leucopus*, y 7% a musarañas de la especie *Blarina brevicauda*. Los buhos de cada una de las áreas de estudio mostraron dietas similares en un 99.2%. Sin embargo, hubo diferencia significativa en la proporción de las especies de presa capturada.

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